REMARKS/ARGUMENTS

Claims 17-39 remain in the application. Claims 40 and 41 have been cancelled. Claims 17-19, 21, 22, 25, 26, 28-37 and 39 have been amended.

Restriction

The USPTO has restricted the claims to Claims 17-39 and have withdrawn Claims 40 and 41. As the USPTO did not accept the arguments concerning traversal of the restriction requirement as it relates to Claim 40, the applicants cancel Claims 40 and 41, leaving Claims 17-39 under examination.

Information Disclosure Statement

The references cited are not currently translated into English. Because it has been determined that neither reference is material to patentability, the applicants have concluded that an English translation of the references is unnecessary at this time. The applicants acknowledge that the references will not be considered by the USPTO.

Claim Objections

The USPTO has objected to Claims 25, 26 and 28 asserting that the Latin names of the microorganisms were not italicized or

underlined. The applicants have amended the claims to correct this informality.

Claim rejections under 35 U.S.C. Section 112

The USPTO has rejected Claims 17-39 under 35 U.S.C. Section 112 as being indefinite. In particular, the USPTO has stated that the phrase "layered silicate composition" is indefinite. In order to overcome this rejection and to conform the claims to the specification, the applicants have deleted the phrase, "layered" silicate, and replaced it with "layer" silicate. This phrase is consistently used throughout the specification to describe the material being treated with the acid-producing microorganism. See, for example, page 1, first paragraph, page 2, fourth full paragraph, last paragraph on page 3 through first full paragraph on page 4, third full paragraph on page 6, second and fourth full paragraphs on page 7 and at various other locations throughout the application.

The phrase "layer silicate" is a "term of art" well recognized in the industry. It refers to the atomic structure of a particular form of silicate rather than its macroscopic structure, which may be present, for example, in a pile of raw clay. Thus, for example, breaking up a pile of raw clay comprising layer silicates into clumps with a size from about 0.5 to about 5 cm according to Claim 29 does not change the nature of the layer structure of the layer

silicates. In addition, layer silicates can be both naturally occurring or manmade.

As evidence that the phrase, "layer silicate," is a "term of art" well recognized in the industry, there is attached to this amendment as Exhibit A the first few pages of Chapter 1 of an analysis of layer silicates contained in "Crystal Structures of Clay Minerals and Their X-ray Identification." Note the significant discussion of various types and characteristics of "layer silicate." Note especially the list of specific layer silicates in Table 1.1 on page 5. Also attached to the amendment as Exhibit B are pages 441-464 from the *Encyclopedia of Polymer Science and Technology*, Volume 12 (1970), which discusses silica and silicates. Beginning on page 445 is a discussion of "layer-lattice silicates" or simply "layer silicates." There is a significant discussion on the next two pages of various types of layer silicates. For example, at the bottom of page 445 it states

> In single-layer silicates, of which kaolin clays are typical examples, a silica sheet and a gibbsite ($Al(OH)_3$) sheet (Fig. 8**a**) are fused together as shown in Figure 9**a** (36). In double-layer silicates, which include montmorillonite- and illite-type clays and the micas, a sandwich structure exists which consists of two silica sheets embedded in a gibbsite or brucite ($Mg(OH)_2$) sheet.

Thus, it is clear from these references that the phrase "layer silicate" is not "indefinite" or "unclear" and is, in fact, well

recognized in the art. Applicants therefore respectfully request that this rejection be withdrawn.

With regard to the use of the term "that" in Claim 17, the applicants have deleted that term from the Claim and therefore request that this rejection be withdrawn. Further, with regard to the phrase "preparing a layered silicate composition," that phrase has also been deleted from the Claims. Finally, the USPTO inquires as to whether the "layered silicate composition" is intended to include "only" man-made compositions or also natural-occurring layered compositions. As stated throughout the application and as well recognized in the art, layer silicates may be man-made or naturally occurring.

The applicants assert that the amendments to the claims and this analysis of the phrase, "layer silicate," overcomes all of the rejections under Section 112.

Claim rejections under Section 102

U.S. Patent No. 3,414,524 The USPTO rejected several of the claims of the application under 35 U.S.C. Section 102 as being anticipated by U.S. Patent No. 3,414,524. The applicants respectfully traverse this rejection.

The applicants have discovered a new process for the activation of layer silicates that are utilized for decolorizing oils, fats and waxes. In this process, as described for example on

page 3 of the application, various oils, waxes and fats are passed through activated layer silicates during one or more treatment stages during a refining process. The oils, waxes and fats are treated in this manner to remove various contaminates, such as pigments, phospholipids and other such material from the oils, et al. In prior art processes the oils were treated by passing them through either untreated layer silicates, such as Fuller's earth or, in an alternative process, by passing them through layer silicates that had been activated by treatment with conventional acids. In the process of the invention, these layer silicates are activated not by use of conventional acids, but rather by use of an acid- producing microorganism. The applicants assert that this process is not disclosed by U.S. Patent No. 3,414,524.

In contrast to the process of the application, U.S. Patent No. 3,414,524 discloses a process for activation of catalyst material by use of a bacteria. A catalyst may be comprised of two separate components, an active catalyst material placed on or within a carrier material, or the catalyst material may function as the catalyst without the presence of a carrier. In some of the processes of U.S. Patent No. 3,414,524, no carrier material is present and the active catalyst material comprises the entire composition of the catalyst. (See Examples I-VI, VIII and IX) In the process of U.S. Patent No. 3,414,524 only the active catalyst material is treated with the bacteria. The carrier material is not

treated with the bacteria. The process of the '524 Patent is disclosed at column 2, lines 3-6, where it states that,

> The method of activation is applicable in the initial preparation of catalysts from virgin material. By the expression "virgin material" when used herein, we mean material which has not previously been used as a catalyst.
>
> Although the virgin material can be treated in the raw state, preferably it is first impregnated onto a carrier.

Thus, the "virgin material", which is the catalyst material, is treated with the bacteria to activate it. There is no suggestion nor would there be any need for treatment of the carrier with this bacteria. The applicants respectfully assert that the reference to silica and bentonite, which are mentioned at column 2, line 10 of the '524 patent, is nothing more than a list of examples of carrier materials onto which catalyst material, which has been activated by bacteria, may be added. In fact, treatment of the carrier with bacteria would be counter-productive as many of the catalysts disclosed in the '524 patent do not even utilize a carrier. Thus, there is no suggestion in U.S. Patent No. 3,414,524 that treatment of carrier material with the bacteria-containing solution would be beneficial to the carrier.

As a further distinguishing feature of U.S. Patent No. 3,414,524, it is necessary to compare the processes taught by the '524 Patent with the process of the invention. The process of the

invention is a process for "increasing the decolorizing activity of a layer silicate for treatment of oils, fats and waxes." In contrast, the process disclosed in U.S. Patent No. 3,414,524 is the treatment of inactive catalyst material with a bacteria. The process of U.S. Patent No. 3,414,524 fails specifically to disclose a process for activating layer silicates by treatment with acid-producing microorganisms to increase their decolorizing activity.

Further, these activated catalysts of the '524 Patent after treatment with the bacteria are used in processes which are entirely different from the process, as claimed. The processes disclosed in the '524 Patent are designed to modify the chemical structure of organic compounds by various conventional catalytic processes, such as hydrogenation, cracking, shifting, etc. There is no disclosure or suggestion in the '524 Patent of activating the carrier material and then using that activated material for the treatment of oils, fats and waxes.

It is also important to note that the process that is taught by the U.S. Patent No. 3,414,524 is the activation of a metallic catalytic material by use of a sulfate-reducing bacteria, which reduces the metal sulfate content of the catalytic material. All examples disclose a catalyst comprising a bauxite material or where the bauxite material forms the carrier. Bauxite (AlOOH) is not a layer silicate. In fact, the bauxite carrier is not affected by this bacteria material. The process of U.S. Patent No. 3,414,524

merely removes sulfates and sulfides from the catalytic material. The carrier material is never activated by the bacteria as is required in the process of the invention.

The present invention describes for the first time the use of an acid producing microorganism for increasing the decolorizing activity of a layer silicate. The applicants respectfully assert that this process is not disclosed by U.S. Patent No. 3,414,524.

U.S. Patent No. 2,813,821

The USPTO has also rejected various claims of the application based on U.S. Patent No. 2,813,821. The applicants respectfully traverse this rejection.

The process of U.S. Patent No. 2,813,821 is a process for the manufacture of a porous metallic oxide catalysts for use in the conversion of hydrocarbons. The steps of the process comprise forming a metallic oxide material and treating that oxide material with a filamentous mold selected from a fairly large list of bacteria. The process includes subjecting the porous material to a microorganism under conditions which encourage its growth, thereby forming an interconnected network of channels interiorly within the porous material. See column 1, lines 62-66.

The key distinction between the process of this patent and that of the application is the nature of the material that is being treated with the bacteria. The material treated by the process of

U.S. Patent No. 2,813,821 must be sufficiently soft or elastic during the period of growth of the bacteria to permit penetration by the bacteria. See column 2, lines 18-20. Preferably these materials are hydrogels of metal oxide. (See Example 1) Hydrogels have an amorphous structure and are not layered on an atomic level. The porous materials specifically referenced in U.S. Patent No. 2,813,821 include preferably silica-alumina compositions. (Column 2, lines 39-43) These materials are not layer silicates. Palygorskites (and all other layer silicates) are aluminum silicates having a completely different chemical structure and properties based on the fact that they are layered on an atomic level. This distinction is discussed in detail in the *Encyclopedia of Polymer Science and Technology* article which is attached to this amendment.

In addition to the difference in starting materials, there is a basic difference in the process for the use of this layer silicate material of the application. The process taught in U.S. Patent No. 2,813,821 is a catalyst process. (See column 2, lines 39-43.) Alternatively, these porous materials can be used for the drying of air. Specifically not included in these processes is the decolorizing of oils, fats and waxes as claimed in all claims of the application. Thus, the particular process which is disclosed and claimed in the claims of the application is not disclosed in U.S. Patent No. 2,813,821.

In conclusion, U.S. Patent No. 2,813,821 fails to disclose the particular material which is used in the applicants' process, i.e., a layer silicate. It also fails to disclose the particular process which is claimed, i.e., a process for increasing the decolorizing activity of a layer silicate for the treatment of oils, fats and waxes.

Rejections under 35 U.S.C. Section 103

The United States Patent and Trademark Office has also rejected all remaining claims of the application under 35 U.S.C. Section 103 as being unpatentable over U.S. Patent Nos. 3,414,524 or 2,813,821 taken in combination with Kusnierova, et al., U.S. Patent No. 1,752,721 and Grudev, et al.

The applicants have already responded to this rejection in the discussion of U.S. Patent No. 3,414,524 and U.S. Patent No. 2,813,821 above. The basis for the distinctions between the claims of the application and these two references, which are discussed above, need not be repeated. As these references have been distinguished, neither can form the basis for a rejection under Section 103. Notwithstanding, the applicants wish to address the other references cited.

Kusnierova, et al. This reference is concerned with the influence of chemolithotrophic soil microorganisms and their metabolites on the structural stability of bentonite clay. The

teaching of this reference is that when bentonite clays are contaminated with various microorganisms, the montmorillonite structure is substantially or completely destroyed and there is a substantial degradation of the silicon structure. Thus, a person skilled in the art reviewing Kusnierova, et al. would be taught away from the process of the application as Kusnierova, et al. teaches that the structure of the bentonite materials is broken down by treatment with the microorganisms. In view of the teaching of this reference, it would be surprising that a layer silicate could be activated, i.e., its decolorizing activity increased, by treatment with acid-producing microorganisms. Accordingly, Kusnierova, et al. alone or in combination with the other references fails to teach the process of the invention and, in fact, teaches away from the process, as claimed by the applicants.

U.S. Patent No. 1,752,721 This reference is merely cited by the USPTO to disclose the feature of crushing raw clay prior to activation. However, as this process is being claimed only in combination with a process for treating layer silicate with an acid producing microorganism, there is no particular relevance to this reference alone.

Grudev, et al. This reference describes the removal of iron oxide contaminants from clay whereby a cultivated bacteria, *Aspergillus niger* is first cultivated at 35°C and then the cultivated solution is added to clay and heated at 90°C. There is

no disclosure or suggestion in Grudev, et al. that acid-producing microorganisms can be used for the process of the invention and specifically no disclosure that they may be used to increase the decolorizing activity of layer silicates, as claimed in Claim 17. Thus, this reference does not add to the teaching of the previous references, U.S. Patent No. 2,813,821 and U.S. Patent No. 3,414,524.

CONCLUSION

Based on these arguments the applicants assert that all claims of the application, as amended, are allowable over the references. If there are questions concerning this response, please contact applicants' counsel.

Respectfully submitted,

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Attachments: Exhibits A and B

CERTIFICATE OF SERVICE

I hereby certify that this correspondence is being forwarded by first class mail to Box Non-Fee Amendment, Commissioner for Patents, Washington, D.C. 20231.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Claims 40 and 41 have been cancelled.

Claims 17-19, 21, 22, 25, 26, 28-37 and 39 have been amended as follows:

17. (Amended) A process for increasing the decolorizing activity of a layer silicate for treatment of oils, fats and waxes comprising the step of ~~the activation of a layered silicate for treatment of oils, fats and waxes comprising~~

~~preparing a layered silicate composition,~~

~~activating that layered~~ treating the layer silicate ~~composition by treating the layered silicate composition~~ with an acid-producing microorganism.

18. (Amended) The process of Claim 17 wherein the ~~layered~~ layer silicate comprises a smectite clay.

19. (Amended) The process of Claim 17 wherein the ~~layered~~ layer silicate comprises a montmorillonite clay.

21. (Amended) The process of Claim 17 wherein the ~~layered~~ layer silicate comprises a palygorskite clay.

22. (Amended) The process of Claim 20 wherein the ~~layered~~ layer silicate further comprises a palygorskite clay.

25. (Amended) The process of Claim 23 wherein the sulfur-oxidizing bacteria comprises Thiobacillus thiooxidans.

26. (Amended) The process of Claim 24 wherein the iron-oxidizing bacteria comprises Thiobacillus ferrooxidans.

28. (Amended) The process of Claim 27 wherein the citric acid-producing microorganism comprises Aspergillus niger.

29. (Amended) The process of Claim 17 wherein the layer silicate is in the form of raw clay and wherein the process further comprises ~~further comprising~~ breaking up the raw clay ~~layered silicate composition prior to activation~~ into clumps with a size from about 0.5 cm to about 5 cm prior to treating the layer silicate.

30. (Amended) The process of Claim 17 further comprising adding the acid-producing microorganisms to an inoculant material prior to ~~activating~~ treating the ~~layered~~ layer silicate ~~composition~~ with the microorganisms which have been added to the inoculant material.

31. (Amended) The process of Claim 30 wherein the population of the microorganisms added to the ~~layered~~ layer silicate is from about 10^6 to about 10^{12} bacteria/g of the inoculant material.

32. (Amended) The process of Claim 17 further comprising maintaining the temperature of the ~~layered~~ layer silicate ~~composition~~ during ~~activation~~ treating within the range from about 20 to about 35°C.

33. (Amended) The process of Claim 17 further comprising maintaining the water content of the ~~layered~~ layer silicate

~~composition~~ during ~~the activating process~~ treating within a range from about 15 percent by weight to about 70 percent by weight.

34. (Amended) The process of Claim 30 wherein the inoculant material added to the ~~layered~~ layer silicate comprises about 5 to about 20 percent of the overall composition after the inoculant material has been added.

35. (Amended) The process of Claim 17 further comprising mixing and aerating the ~~layered~~ layer silicate ~~composition~~ while it is being ~~activated~~ treated with the acid-producing microorganism.

36. (Amended) The process of Claim 35 wherein the ~~activation~~ treating process occurs for a period of time from about 1 to about 365 days.

37. (Amended) The process of Claim 17 further comprising adding nutrients for the microorganisms to the ~~layered~~ layer silicate ~~composition~~ prior to ~~activation~~ treating with the acid-producing microorganisms.

38. (Amended) The process of Claim 17 further comprising adding small quantities of a dilute acid to the ~~layered~~ layer silicate ~~composition~~ prior to ~~activation~~ treating with the acid-producing microorganisms.